C14 cancl.

means being delayed relative to one another, each of the plurality of RAKE processors being adapted to align and scale its respective input to produce a compensated output.

11. (Once Amended) A system for receiving a signal, comprising:

an antenna adapted to receive a signal and adapted to generate an output signal, the output signal being decomposable into:

(i) a first CDMA signal portion attributable to a first source, and

(ii) at least one second CDMA signal portion, the at least one second CDMA signal portion being attributable to at least one second source; and,

C17

a projection filter in communication with the antenna for determining the first CDMA signal portion of the output signal, the projection filter being in communication with the antenna and determining the first CDMA signal portion of the output signal by projecting a signal space spanned by the output signal onto a first signal space that corresponds to the first CDMA signal portion, wherein the first signal space is orthogonal to an interference space that corresponds to one or more interference code matrixes corresponding to the at least one second CDMA signal portion.

13. (Once Amended) The system of Claim 12, further comprising a projection builder operable to determine a projection operator corresponding to the first CMA signal portion by the following equation:

C18 Cancl.

$$(y^T(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS)^{-1}S^T)y)/\sigma^2$$

wherein y corresponds to the output signal, H is related to an interference code matrix of the first source, S is related to an interference code matrix of at least a second source, ^{T} denotes the transpose operation, I denotes the identity matrix, and σ^2 corresponds to the variance of the magnitude of the noise portion.

14. (Once Amended) The system of Claim 12, further including a plurality of projection filters corresponding to a plurality of antennas and being in communication therewith, each of the plurality of projection filters being adapted to determine a respective first CDMA signal portion of a corresponding portion of the signal received by each of the plurality of antennas and determine the respective first CDMA signal portion of the signal using the equation of Claim 13.

C13 Cont.

15. (Once Amended) The system of Claim 14, further including a plurality of RAKE processors in communication with a corresponding one of the plurality of projection filters, wherein each of the plurality of projection filters produces a corresponding projection filter output which is received as a RAKE processor input by its corresponding RAKE processor, the corresponding projection filter output of each of the plurality of projection filters being delayed relative to one another, each of the plurality of RAKE processors being adapted to align and scale their respective inputs to produce a corresponding compensated output.

16. (Once Amended) The system of Claim 15, wherein the corresponding compensated output of each of the plurality of RAKE processors is delivered to a second projection filter in communication therewith for determining a refined first CDMA signal portion of each of the compensated outputs.

C18 Cont.

17. (Once Amended) The system of Claim 12, wherein the first CDMA signal portion comprises a plurality of multipath signal segments and the projection filter outputs a correlation function having a plurality of peaks corresponding to the plurality of multipath signal segments, and further comprising:

a threshold detector, in communication with the projection filter, for generating timing information defining a temporal relationship among the plurality of peaks.

19. (Once Amended) The system of Claim 18, further comprising:

C19

one or more RAKE processors, in communication with the projection filters and the timing reconciliation device, for aligning the plurality of multipath signal segments in at least one of time and phase based on the magnitudes of the plurality of multipath signal segments and the reference time to form an aligned first CDMA signal.

29. (Once Amended) The method of Claim 20, further comprising the step of generating at least one projection operator according to the equation:

C20 Cont.

$$(y^T(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS)^{-1}S^T)y)/\sigma,^2$$

Cancel.

where y corresponds to the composite signal, H is related to an interference code matrix of the first emitter, S is related to an interference code matrix of at least a second emitter, ^{T} denotes the transpose operation, I denotes the identity matrix and σ^2 corresponds to the variance of the magnitude of a noise portion of the composite signal.

39. (Once Amended) The method of Claim 29, further comprising the step of generating a plurality of projection operators according to the equation:

$$(y^T(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS)^{-1}S^T)y)/\sigma,^2$$

where y corresponds to the composite signal, H is related to an interference code matrix of the first emitter, S is related to an interference code matrix of at least a second emitter, ^{T} denotes the transpose operation, I denotes the identity matrix and σ^2 corresponds to the variance of the magnitude of a noise portion of the composite signal.

Cancel.

40. (Once Amended) A system for processing an output signal of an antenna, the output signal corresponding to a composite signal, comprising:

at least one projection filter for determining a parameter of an oblique CDMA projection of an output signal of an antenna, the oblique CDMA projection being attributable to an emitter having an interference code matrix and the at least one projection filter determining a parameter of the oblique CDMA projection by projecting obliquely a signal space spanned by the output signal onto a signal space spanned by the oblique CDMA projection and wherein an interference space corresponds to an interference code matrix

corresponding to a second CDMA signal segment in the composite signal and the interference space is orthogonal to CDMA signal space spanned by the oblique CDMA projection.

42. (Once Amended) The system of Claim 40, further comprising a plurality of projection builders corresponding to a plurality of antennas and being in communication therewith, each of the plurality of projection builders being adapted to determine a respective oblique CDMA projection of a corresponding portion of a respective composite signal received by each of the plurality of antennas and determine the respective oblique CDMA projection of the corresponding output signal by the equation:

$$(y^T(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS^{-1})S^T)y)/\sigma^2$$

where y corresponds to the output signal, H is related to an interference code matrix of the emitter, S is related to an interference code matrix of at least a second emitter, ^{T} denotes the transpose operation, I denotes the identity matrix, and σ^2 corresponds to the variance of the magnitude of a noise portion of the output signal.

43. (Once Amended) The system of Claim 42, wherein the at least one projection filter comprises a plurality of projection filters corresponding to the plurality of antennas and further comprising a plurality of RAKE processors in communication with a corresponding one of the plurality of projection filters, wherein each of the plurality of projection filters produces a corresponding projection filter output which is received as a RAKE processor

input by each of the plurality of projection filter's corresponding RAKE processor, the corresponding projection filter output of each of the plurality of projection filters being delayed relative to one another, each of the plurality of RAKE processors being adapted to align and scale their respective inputs to produce a corresponding compensated output.

44. (Once Amended) The system of Claim 43, wherein the corresponding compensated output of each of the plurality of RAKE processors is delivered to a second projection filter in communication therewith for determining a refined projection filter of each of the compensated outputs.

C22 Cont.

45. (Once Amended) The system of Claim 40, wherein the oblique CDMA projection comprises a plurality of multipath signal segments and the projection filter outputs a correlation function having a plurality of peaks corresponding to the plurality of multipath signal segments, and further comprising:

a threshold detector, in communication with the projection operator, for generating timing information defining a temporal relationship among the plurality of peaks.

47. (Once Amended) The system of Claim 46, further comprising:

C23 Cont.

one or more RAKE processors, in communication with the projection filters and the timing reconciliation device, for aligning the plurality of multipath signal segments in at least

Cl 3 cont.

one of time and phase based on the magnitudes of the plurality of multipath signal segments and the reference time to form an aligned first signal.

Please add the following new Claims 62-111:

62. (New) A system for processing a coded signal, comprising:

an input for receiving a coded signal, the coded signal being decomposable into a first signal segment and at least a second signal segment, the first signal segment being attributable to a first emitter, and the at least a second signal segment being attributable to at least a second emitter different from the first emitter; and

at least a first correlator operable to output at least a first correlation function corresponding to the first signal segment of the coded signal, the first correlator being operable to project a coded signal space spanned by the coded signal onto a first signal space spanned by the first signal segment to determine a parameter associated with the first signal segment, wherein the first signal space is orthogonal to an interference space corresponding to at least one interference code matrix associated with the at least a second signal segment.

Cl 4 cont.

63. (New) The system of Claim 62, wherein the at least a first correlator is operable to obliquely project the coded signal space onto the first signal space.

64. (New) The system of Claim 62, wherein the first correlator comprises:

at least a first projection builder operable to output a first set of projection operators.

65. (New) The system of Claim 64, wherein the at least a first projection builder generates each projection operator in the first set using the following mathematical expression:

$(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS^{-1})S^T)$, where H is related to a first interference code matrix of the first emitter, S is related to the at least one interference code matrix of the at least a second emitter, ^{T} denotes the transpose operation, and I denotes the identity matrix.

66. (New) The system of Claim 64, wherein the at least a first correlator comprises:

Cont

a user code generator operable to output for the first emitter a set of trial transmit times and candidate symbols corresponding to the first signal segment and, for each pairing of trial transmit times and candidate symbols in the set, generate a candidate user code for the first emitter and wherein the at least a first projection builder uses the candidate user codes to determine the first set of projection operators.

67. (New) The system of Claim 66, wherein the at least a first correlator comprises:

a bank of projection filters, each projection filter in the bank of projection filters corresponding to each projection operator in the first set of projection operators, operable to output the at least a first correlation function.

68. (New) The system of Claim 67, wherein each of the projection filters is operable to output the at least a first correlation function attributable to the first emitter from the corresponding projection operator in the first set of projection operators while simultaneously nulling out interference attributable to emitters different from the first emitter.

69. (New) The system of Claim 67, further comprising:

a threshold detector operable to determine temporal locations of selected peaks in the at least a first correlation function.

Cont

70. The system of Claim 69, further comprising:

a timing reconciliation device operable to determine a reference time based on the temporal locations of the selected peaks.

71. (New) The system of Claim 70, wherein the at least a first correlation function comprises a plurality of correlation functions and further comprising:

based on the reference time, a RAKE processor operable to scale and align in time and phase the plurality of correlation functions to form a plurality of aligned and scaled correlation functions and sum the plurality of aligned and scaled correlation functions to form a RAKE output.

72. (New) The system of Claim 71, further comprising:

a demodulator operable to determine, based on the RAKE output, an actual transmit time for the first signal segment.

73. (New) The system of Claim 72, wherein the demodulator comprises:

a second user code generator operable to output for the first emitter a second set of trial transmit times and candidate symbols corresponding to the first signal segment and, for each pairing of trial transmit times and candidate symbols in the set, generate at least a second candidate user code for the first emitter;

a second projection builder to determine, for the at least a second candidate user code and based on the RAKE output, a second set of projection operators; and

a second bank of projection filters, each filter being associated with a projection operator in the second set of projection operators, operable to output at least a second correlation function.

74. (New) The system of Claim 73, further comprising:

a second threshold detector operable to determine an actual transmit time and symbol based on the at least a second correlation function.

75. (New) The system of Claim 74, further comprising:

a decoder operable to despread the RAKE output using the actual transmit time and symbol.

76. (New) The system of Claim 62, further comprising:

at least one antenna operable to receive the coded signal and

at least one output operable to output first and second channel signals corresponding to the coded signal.

Cont'd

77. (New) The system of Claim 76, wherein the first channel signal corresponds to an in-phase portion of the coded signal and the second channel signal corresponds to a quadrature portion of the coded signal.

78. (New) A method for processing a coded signal, comprising:

providing a coded signal, the coded signal comprising a first signal segment and at least a second signal segment; and

projecting a coded signal space spanned by the coded signal onto a first signal space spanned by the first signal segment to determine a parameter associated with the first signal segment, wherein the first signal space is orthogonal to an interference space corresponding to at least one interference code matrix associated with the at least a second signal segment.

79. (New) The method of Claim 78, wherein in the projecting step the coded signal space is obliquely projected onto the first signal space.

80. (New) The method of Claim 78, wherein the output of the projecting step is at least a first correlation function corresponding to the first signal segment.

81. (New) The method of Claim 80, further comprising:

generating a first set of projection operators associated with the first signal segment.

Cont

82. (New) The method of Claim 81, wherein the generating step is performed using the following mathematical expression:

$(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS^{-1})S^T)$, where H is related to a first interference code matrix of the first emitter, S is related to the at least one interference code matrix of the at least a second emitter, ^{T} denotes the transpose operation, and I denotes the identity matrix.

83. (New) The method of Claim 81, further comprising:

outputting for the first emitter a set of trial transmit times and candidate symbols corresponding to the first signal segment; and

for each pairing of trial transmit times and candidate symbols in the set, generating a candidate user code for the first emitter and wherein the candidate user codes are used to generate the first set of projection operators.

84. (New) The method of Claim 83, further comprising

detecting temporal locations of selected peaks in the at least a first correlation function.

Cont'd

85. (New) The method of Claim 84, further comprising:

determining a reference time based on the temporal locations of the selected peaks.

86. (New) The method of Claim 85, wherein the at least a first correlation function comprises a plurality of correlation functions and further comprising:

based on the reference time, scaling and aligning in time and phase the plurality of correlation functions to form a plurality of aligned and scaled correlation functions; and

summing the plurality of aligned and scaled correlation functions to form a RAKE output.

87. (New) The method of Claim 86, further comprising:

determining, based on the RAKE output, an actual transmit time for the first signal segment.

88. (New) The method of Claim 87, further comprising:

outputting for the first emitter a second set of trial transmit times and candidate symbols corresponding to the first signal segment; and

for each pairing of trial transmit times and candidate symbols in the set, generating at least a second candidate user code for the first emitter.

89. (New) The method of Claim 88, further comprising:

determining, for the at least a second candidate user code and based on the RAKE output, a second set of projection operators; and

based on the second set of projection operators, outputting at least a second correlation function.

90. (New) The method of Claim 89, further comprising:

determining an actual transmit time and symbol based on the at least a second correlation function.

91. (New) The method of Claim 90, further comprising:

despreading the RAKE output using the actual transmit time and symbol.

92. (New) The method of Claim 78, further comprising:

converting the coded signal into first and second channel signals.

93. (New) The method of Claim 92, wherein the first channel signal corresponds to an in-phase portion of the coded signal and the second channel signal corresponds to a quadrature portion of the coded signal.

94. (New) A system for processing a coded signal, comprising:

an input for a coded signal, the coded signal being decomposable into a first signal segment and at least a second signal segment; and

at least a first projection filter operable to project a coded signal space spanned by the coded signal onto a first signal space spanned by the first signal segment to determine a parameter of the first signal segment, wherein the first signal space is orthogonal to an interference space corresponding to at least one interference code matrix associated with the at least a second signal segment.

95. (New) The system of Claim 94, wherein the at least a first projection filter is operable to project obliquely the coded signal space onto the first signal space, the first signal segment being attributable to a first emitter having a first interference code matrix.

96. (New) The system of Claim 95, wherein the at least a first projection filter outputs at least a first correlation function corresponding to the first signal segment.

97. (New) The system of Claim 96, further comprising:

at least a first projection builder operable to output a first set of projection operators.

98. (New) The system of Claim 97, wherein the at least a first projection builder generates each projection operator in the first set using the following mathematical expression:

$(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS^{-1})S^T)$, where H is related to the first interference code matrix of the first emitter, S is related to the at least one interference code matrix of at least a second emitter different from the first emitter and associated with the at least a second signal segment, ^{T} denotes the transpose operation, and I denotes the identity matrix.

Cont.

99. (New) The system of Claim 97, further comprising:

a user code generator operable to output for the first emitter a set of trial transmit times and candidate symbols corresponding to the first signal segment and, for each pairing of trial transmit times and candidate symbols in the set, generate a candidate user code for the first emitter and wherein the at least a first projection builder uses the candidate user codes to determine the first set of projection operators.

100. (New) The system of Claim 99, further comprising:

a bank of projection filters, each projection filter in the bank of projection filters corresponding to each projection operator in the first set of projection operators, operable to output the at least a first correlation function.

101. (New) The system of Claim 100, wherein each of the projection filters is operable to output the at least a first correlation function attributable to the first emitter from the corresponding projection operator in the first set of projection operators while simultaneously nulling out interference attributable to emitters different from the first emitter.

Cont.

102. (New) The system of Claim 101, further comprising:

a threshold detector operable to determine temporal locations of selected peaks in the at least a first correlation function.

103. The system of Claim 102, further comprising:

a timing reconciliation device operable to determine a reference time based on the temporal locations of the selected peaks.

104. (New) The system of Claim 103, wherein the at least a first correlation function comprises a plurality of correlation functions and further comprising:

based on the reference time, a RAKE processor operable to scale and align in time and phase the plurality of correlation functions to form a plurality of aligned and scaled correlation functions and sum the plurality of aligned and scaled correlation functions to form a RAKE output.

105. (New) The system of Claim 104, further comprising:

a demodulator operable to determine, based on the RAKE output, an actual transmit time for the first signal segment.

Cont.

106. (New) The system of Claim 105, wherein the demodulator comprises:

a second user code generator operable to output for the first emitter a second set of trial transmit times and candidate symbols corresponding to the first signal segment and, for each pairing of trial transmit times and candidate symbols in the set, generate at least a second candidate user code for the first emitter.

a second projection builder to determine, for the at least a second candidate user code and based on the RAKE output, a second set of projection operators; and

a second bank of projection filters, each filter being associated with a projection operator in the second set of projection operators, operable to output at least a second correlation function.

107. (New) The system of Claim 106, further comprising:

a second threshold detector operable to determine an actual transmit time and symbol based on the at least a second correlation function.

108. (New) The system of Claim 107, further comprising:

a decoder operable to despread the RAKE output using the actual transmit time and symbol.

109. (New) The system of Claim 94, further comprising:

Cont Cont.

at least one antenna operable to receive the coded signal and

at least one output operable to output first and second channel signals corresponding to the coded signal.

110. (New) The system of Claim 109, wherein the first channel signal corresponds to an in-phase portion of the coded signal and the second channel signal corresponds to a quadrature portion of the coded signal.

111. (New) The system of Claim 94, wherein the at least a first projection filter is a plurality of projection filters operable to project obliquely a respective coded signal space corresponding to a respective coded signal onto a respective first signal space spanned by a respective first signal segment of the respective coded signal.